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WATERWAY TRANSPORTATION FOR OHIO AGRICULTURE

By

Michael J. Pesch and Donald W. Larson

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This is the first interim report on a series of studies analyzing transportation services for Ohio agriculture. The waterway report is presented in three sections. The first section describes barge transportation services in Ohio and discusses the issues related to Ohio barge shipments. The next section reviews Great Lakes shipping at the Port of Toledo while the third section analyzes the general issues related to waterway transportation in the State of Ohio.

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Ohio Barge Transportation

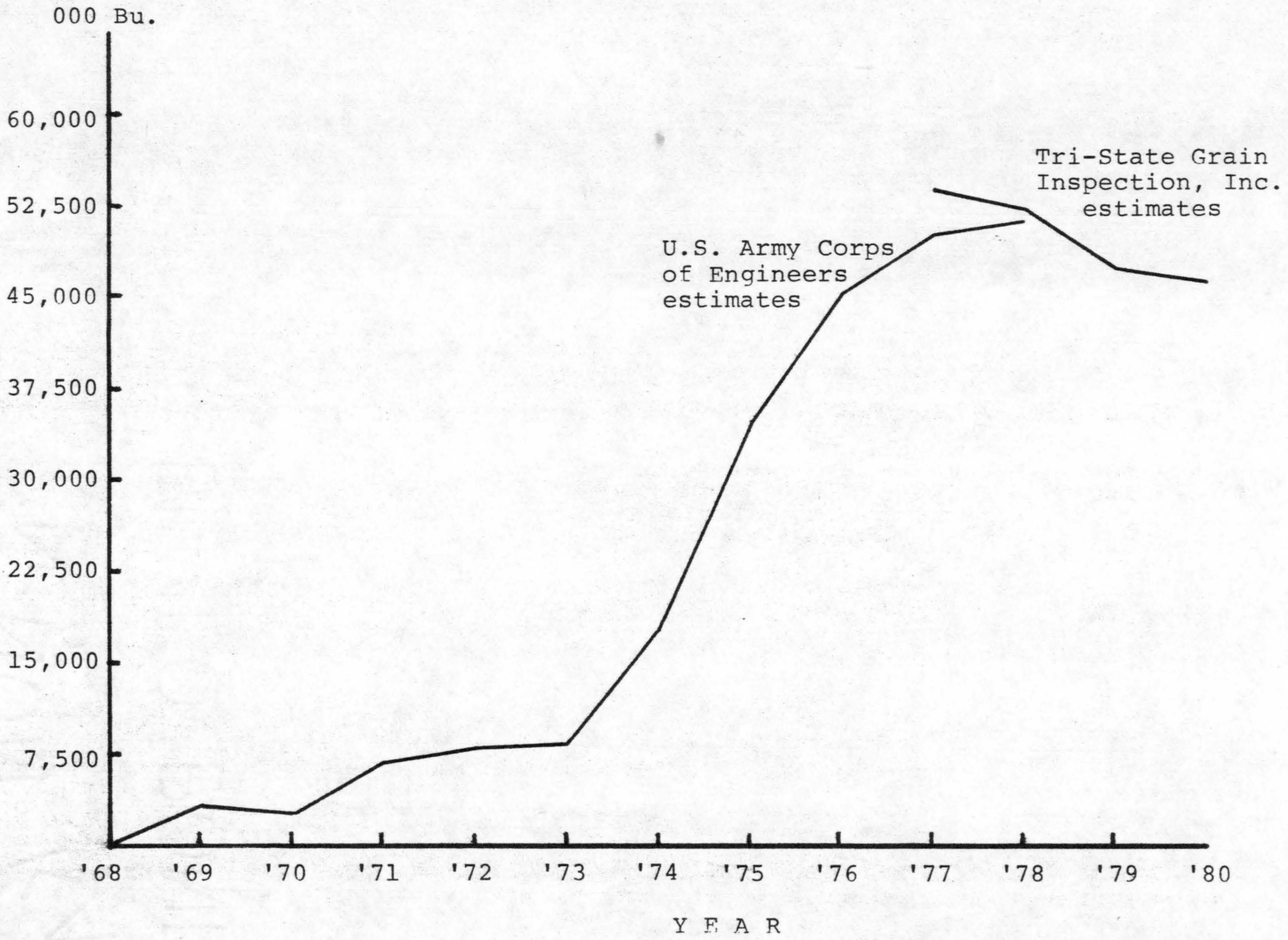
Introduction

Ohio has a geographical advantage which gives agricultural producers in that state unique access to export markets via the Great Lakes, the Gulf of Mexico, and the Atlantic Coast, as well as domestic markets in the Southeast. While grain shippers in the Upper Midwestern states have a limited range of market alternatives available to them, Ohio grain can flow to any one of at least four market areas. Because of this, it is important to understand that the level of barge services used by Ohio agriculture is likely to be more easily influenced by fluctuating barge rates than the levels of service in states like Iowa and Minnesota. This section will discuss the physical aspects and advantages of Ohio barge transportation, the role of the United States Army Corps of Engineers in developing and maintaining the Ohio River, and the controversy over waterway costs and user charges. In addition to examining the factors which cause barge rates to fluctuate, this section will also evaluate the impact of the Barge Freight Call Session and its attempt to improve on the pricing of barge transportation. Since energy efficiency is of major importance in figuring the costs of transportation, the elements which can improve on or detract from energy efficiency in barge transportation will be indicated and assessed.

Advantages for Ohio Barge Shippers

Between 1973 and 1978 barge shipments of grain from the Port of Cincinnati increased by more than 500 percent. Figure 1 plots grain

Figure 1: Port of Cincinnati Grain Barge Shipments By Year



shipment estimates from the U.S. Army Corps of Engineer up to 1978.[1/] Since estimates for 1979-80 were not yet available from the Corps, statistics from the Tri-State Grain Inspection Service, Inc. of Cincinnati were used to estimate the levels of barge grain shipments through 1980. Although shipments by water from Cincinnati are only approximately one-fourth the tonnages shipped from the Port of Toledo (In 1980, 47 million bushels were shipped from Cincinnati versus 167 million bushels from Toledo.) the Cincinnati market offers unique advantages to Ohio, Indiana, and Kentucky grain producers.

Accessibility to ports at the Gulf of Mexico is one of these advantages. In comparison to East Coast ports, the port facilities at the Gulf are deeper and better equipped to handle the large drafts of modern ocean freight vessels. In addition, as world demand for U.S. grain increases, the Gulf presently has greater capacities to load grain for export than do the older Eastern ports.

Cincinnati realizes another advantage during the winter months when both the upper Mississippi River and the Great Lakes system are frozen. Because the Ohio River rarely freezes, Cincinnati grain is much less costly to ship during the winter season than grain from the Upper Midwestern states. As a result, Cincinnati grain is at a premium every year from December through March. Even during the fall

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[1/] The data for commodity movements on the river, supplied by the Army Corps of Engineers, does not indicate which side of the river a commodity originated from or was shipped to. Specific origins and destinations of transported commodities are also not revealed. This is done purposely to protect firms which ship or receive commodities on the river. It is therefore impossible to determine the exact contribution of Ohio commerce to Ohio River traffic. Table 1 lists all grain barge loading facilities and storage capacities located upstream from and including North Bend, Ohio. Those facilities not having storage capacities load grain on barges directly from the truck which carried the grain to the facility. Since most Ohio grain barge shipments are loaded at Cincinnati, this analysis often refers to the "Cincinnati barge market" when referring to barging activities in the State of Ohio.

Table 1: Barge Loading Facilities for Grain on the Ohio Portion of the Ohio River, 1981

Location	Firm	Storage Capacity (000 Bu)
Wheelersburg, Ohio	North Bend terminal (Consol. Grain (truck direct)	0
Portsmouth, Ohio	Early & Daniel (truck direct)	0
Silver Grove, Ky.	Landmark Co-op	300
Cincinnati, Ohio	Early & Daniel	4,000
	Central Soya	120
	Pillsbury	350
	Indiana Grain-Queen City Elev.	1,500
	Queen City Grain, Inc.	650
North Bend, Ohio	North Bend terminal (Consolidated Grain)	50

harvest season when the Upper Mississippi is not frozen, the Cincinnati grain market enjoys the advantages of shipping grain down the Ohio River, avoiding the perenially congested area of the Mississippi's Lock and Dam 26 at Alton, Illinois.

Ohio barge shippers also enjoy the physical advantages of shipping via the Ohio River. An official at the U.S. Army Corps of Engineers in Cincinnati describes the Ohio River as "a one-half mile wide, first-class highway." With its relatively long "pools" of water between its locks and dams, the Ohio is especially suited for barge transportation. Chronic problems such as excessive sediment deposits, sharp bends, and swift currents are remarkably lacking on the river.

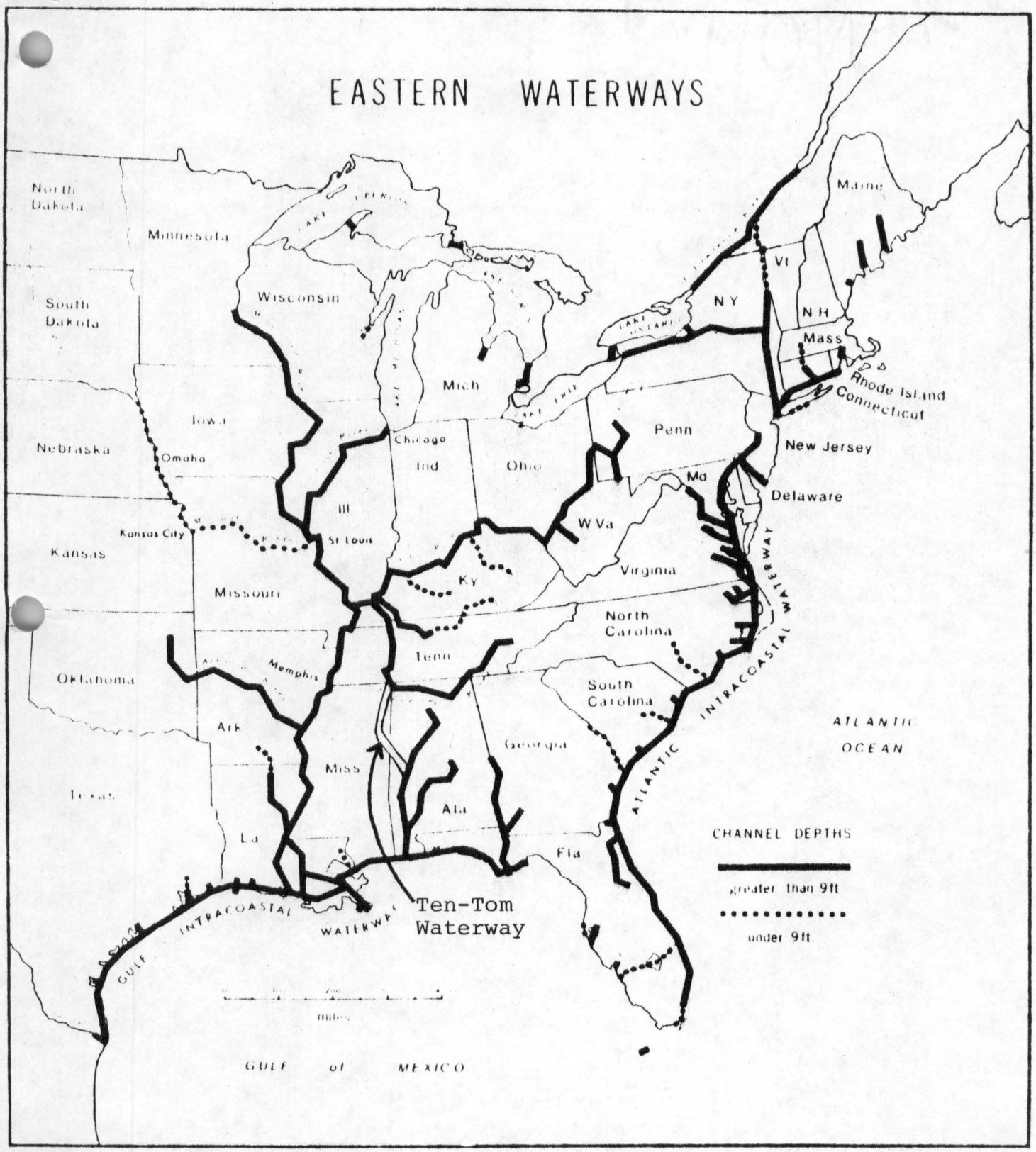
Another development which is expected to favorably affect Ohio barge shipping is the completion of the Tennessee Tombigbee Waterway. Figure 2 illustrates the plan to link the Tennessee River to the Tombigbee River and provide a water route from Ohio to the Gulf which bypasses the Mississippi River. Barging costs for Ohio traffic to the Gulf will fall because the waterway reduces the number of miles to ocean vessel loading facilities at Mobile, Alabama.

The barge industry as a whole experiences few disruptions of service as a result of labor troubles. When viewed in light of the chaos which ensues whenever strikes are called in the railroad and trucking industries, the lack of labor strife in barge transportation is undeniably beneficial to barge shippers.

River Development and U.S. Army Corps of Engineers

Because of the limitations of lock size, barge tows on the Ohio cannot exceed a maximum of fifteen barges per tow. This limitation is not considered to be restrictive by Ohio River shippers since the

Figure 2: Illustration of the proposed Tennessee Tombigbee Waterway



average barge tow on the Ohio is an assembly of six barges. The conclusion among grain shippers and Army Corps of Engineers officials is that the lock and dam network on the Ohio is more than adequate to handle both the present and the expected future demands of river traffic. However, the Corps stresses that river maintenance and improvement operations are continuous in nature. The river system, like a piece of machinery, must be constantly maintained and rebuilt. Currently, the Ohio River System is being rebuilt for the third time since 1824 when river development was first begun.

The U.S. Army Corps of Engineers is responsible for the development and operation of the U.S. inland water system. To accomplish its task, the Corps must work closely with private users of water facilities as well as all government agencies involved. Grain businesses in Cincinnati seem to have comfortable relationships with the Corps and the regulating agencies. One grain shipper simply makes "adjustment in management philosophy" to accommodate government requirements.

The Corps of Engineers spent $150 million in 1976 for operations and improvements on the 2,776 waterway miles in the Ohio River Basin. In addition to the Ohio River, the Basin includes the Tennessee and Cumberland rivers and many other smaller rivers. An official at the Corps in Cincinnati emphasizes that the benefits gained for each dollar spent on maintaining this waterway system make waterway maintenance decidedly cost-effective when compared to the costs and benefits of other transportation modes.

User Charges

While most transportation officials would not argue the point of waterway cost-effectiveness, there is little agreement, especially

in the railroad industry, that waterways should continue to be maintained with government funds. Railroads contend that waterway users should pay for their own facilities. Rates for water transportation would then reflect the true costs of providing service and railroads could compete for traffic more effectively.

A user charge in the form of a diesel fuel tax was imposed on the barge industry by federal legislation in 1978. The tax, which initially was set at four cents per gallon, is scheduled to increase to ten cents per gallon in 1984. The debate over this legislation centered on calculations that a 70 cents per gallon tax was needed for full cost recovery. A research study was completed in 1979 by Virginia Polytechnic Institute and State University which assessed the likely impact of the user fuel tax on the movement of grains and the location of the broiler chicken industry. The results suggested that even if a user charge was set at a level where full federal operation and maintenance costs are recovered, the overall impact on both grain movements by barge and the location of the broiler chicken industry would be small. A lower fuel tax, such as the one implemented by the 1978 legislation, would have virtually no effect on these activities. The study specifically noted, however, that some grain movements on the Ohio River were more sensitive to user charges than grain movements on the Mississippi, for example. This sensitivity was determined to be the result of a high level of intermodal competition between barge transportation to the Gulf and railroad service to the East Coast.

The Virginia Polytechnic study is by no means the final word on whether commercial water transportation should pay full operating costs. User charges are politically controversial and it is unlikely

that barge operators and their customers will wait and passively accept higher fuel taxes. Despite this, the study is significant to this report in that it indicates how user charges might influence grain flows and the broiler industry in Ohio.

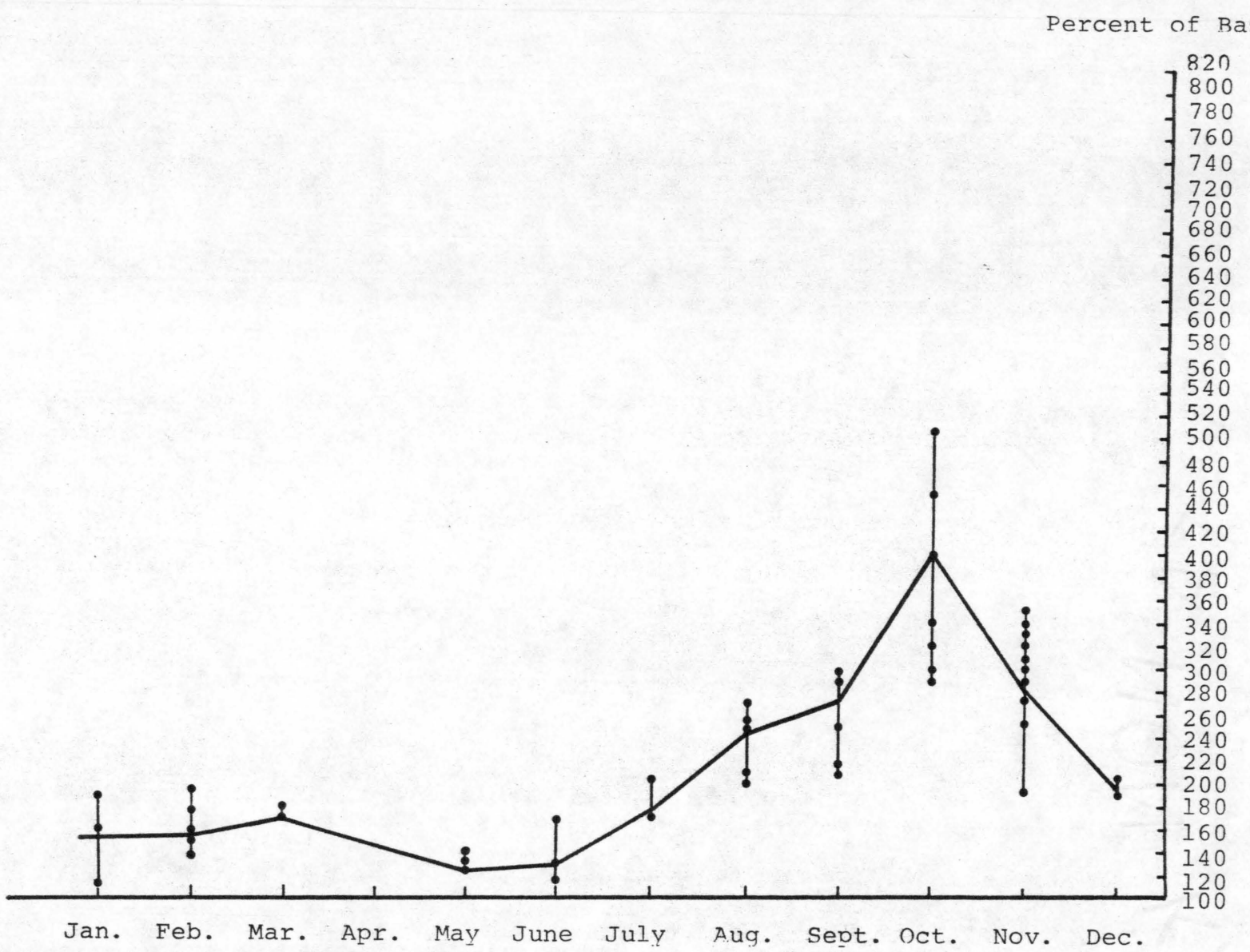
Demand and Supply Elements in Barge Rates

The Cincinnati grain market is strong because the barge mode is traditionally an inexpensive means to ship grain to Gulf ports. However, the fact that barge rates for bulk commodities like grain are not regulated by the Interstate Commerce Commission makes barge shippers highly vulnerable to demand and supply. Relatively high rates for downriver barges during the grain harvest season are an obvious example of how barge rates reflect the varying pressures of demand and supply on the barging industry (Figure 3). However, the less obvious factors which may or may not influence the availability and price of downriver barges must also be given serious consideration.

One of these factors is the foreign demand for U.S. coal. Coal which is bound for export markets is shipped by the same downriver barges which are needed for export grain shipments. Any increase in demand for export coal places upward pressure on barge rates as competition for downriver barges intensifies.

Upriver barge movements can also adversely affect downriver rates. A disruption in the supply of a commodity which normally moves upriver by barge may require a greater proportion of round trip barge costs to be absorbed by downriver traffic. Traditionally, downriver traffic pays more of round trip costs than upriver traffic. With a reduction in the volume of upriver traffic, the cost burden to downriver traffic would become even larger.

Figure 3: Typical Monthly Barge Rates For Grain Shipments on Ohio River, 1980



1/ The base rate for grain shipped by barge from Cincinnati to the Gulf equals $4.69 per ton or $.13 per bushel of corn.

Barge rates reflect the quality and availability of service in other modes of transportation. Labor strikes and car shortages in the railroad industry have caused temporary but substantial increases in barge rates as grain shippers and other rail users are forced to seek transportation alternatives.

Barge rates also reflect rising insurance costs. The recent passage of two acts caused barge insurance rates to soar. One of these acts, the Environmental Protection Act, placed total financial responsibility on the parties involved in any spillage of pollutants into river waters. The other act was the Jones Act which removed liability limitations in employee injury claims. In many cases insurance rates tripled as a result of the increased financial risk of barge operation [3].

Factors Which Affect Energy Efficiency in Barging

Energy efficiency is probably the major cost advantage in shipping grain and other bulk commodities by barge. But in order to maximize this savings, a number of key factors must be considered.

Efficient use of equipment is crucial to keeping barging costs low. While barges usually operate with full loads on each way of a round trip, railroads typically run empty when returning from delivering grain to the East Coast. By distributing round trip costs over traffic in both directions, barge operators are able to hold down shipping rates.

Another example of efficient use of equipment in the barge industry is the very low "turnabout" times that are maintained. Since barge rates reflect barge availability, it is important that a barge be made available as soon as possible after it reaches a destination.

"Draft"[2/] is a third factor which is crucial to the efficiency of barge transportation. Fully loaded barges have drafts of 8½ to 9 feet. To maintain river channels at a 9 foot minimum dept, the Army Corps of Engineers conducts vigilant dredging operations. When low water makes it impossible to sustain this minimum level, barges must travel with partial loads to avoid costly groundings. Since the cost of towing heavier barges does not increase proportionately to an increase in payload, a barge tow loses efficiency when it cannot operate fully loaded. Each additional inch of draft on a standard size barge represents a tonnage potential of approximately 17 tons. It is therefore necessary to the efficiency of barge transportation that the Army Corps of Engineers has the resources to maintain channel depths on the U.S. river system.

Adverse Effects of Weather on Barge Costs

In comparison to other transportation modes, barging is unusually vulnerable to natural phenomena. Shipping costs can escalate rapidly if flooding, low water, or winter freezeups delay river traffic. Only months ago, traffic on the Mississippi River was seriously hampered by near-record low water levels. Navigable river channels became too narrow for upstream and downstream barge tows to pass each other. When a barge ran aground at Caruthersville, Missouri, it took two days to clear the channel; in the meantime, 77 towboats, some losing as much as $2,500 an hour, had been delayed. In addition to enduring delays, barge shippers had to lighten barge loadings and reduce the size of barge tows, thereby increasing their per-ton shipping costs.

[2/] "Draft" is the minimum water depth necessary to avoid grounding a vessel.

When travel is restricted on the Lower Mississippi, barge shippers of grain on the Ohio River encounter problems not only in delivering their loaded barges to the Gulf, but also in obtaining a sufficient number of barges that are available for loading. Weather problems for Ohio barge shippers are obviously not limited to conditions on the Ohio River; anything which affects traffic on the Lower Mississippi also affects traffic on the Ohio.

Pricing Barge Transportation

Obtaining adequate information necessary for the accurate pricing of barge transportation has been one problem faced by barge shippers and barge companies. Since barge rates for grain and other bulk commodities are entirely negotiable, barge rates can fluctuate widely. Shippers and barge firms have been reluctant to disclose the results of their negotiations and therefore actual shipping charges could not be systematically collected and published. As a result, it has been difficult for public and private decision-makers to form judgments based on the projected costs of barge transportation. There is evidence, however, that the pricing information gap in the grain barge market may narrow.

The Barge Freight Call Session

Competition for grain among Cincinnati grain firms is so intense that there is no price differentiation between grain that is bought from an elevator and grain that is bought directly from the farmer. Competition for grain at the level experienced in Cincinnati, together with the volatility of rates in the barge market, have led to the establishment of barge contracting in an open-auction, cash trading situation. The Barge Freight Call Session, launched by the

Merchants Exchange of St. Louis on August 1, 1978, is the result of a need for better pricing accuracy in barge transportation. The call session is a cash market, not a futures market. A contract is made between buyer and seller which explicitly addresses such items as shipment date, quantities, minimums, points of origin and destination, demurrage, products carried, insurance, payment terms, alteration of bids/offers, and Merchant Exchange charges.

The Barge Freight Call Session accounts for approximately five percent of grain tonnage that is shipped on the Mississippi, Illinois, Ohio, and Missouri rivers. Yet, the entire grain barge freight market appears to follow the prices established in the call session each day. The call session is said to serve as a "barometer of values" for the entire grain freight market.

Gladwell [2] discloses information indicating that grain companies which are also barge owners "may exert some degree of domination over the call session."

> An analysis of the 26 companies trading barge service on the call session in 1979 reveals that five of the members were involved in well over half of the trades, about 58 percent, and that <u>all five of those members were grain companies that were also barge owners</u>. On the other hand, there were only three "pure" carriers (companies for which barge transportation is the primary means of revenue) that participated in the call sessions in 1979, and they were involved in about three percent of the trades. (parentheses and emphasis added)

Gladwell suggests "pure" carriers are reluctant to participate in the call session because unlike the grain companies, they lack a

trading background. However, it appears to be in the better interests of the "pure" carriers to strengthen their role in the call session if indeed the session is a gauge for the entire grain freight market.

The domination of the call session by grain shippers and resellers would seem to indicate the session is economically favorable to both these parties. Grain shippers and resellers in Ohio do not have to participate or even ship grain by barge to benefit from the Barge Freight Call Session. Pricing information is invaluable in transportation decision-making and the information provided by the call session is of high quality and easily obtainable. Regardless of the transportation mode a shipper selects, that shipper will benefit from having accurate barge market information.

Presently, the call session for northbound commodities is hampered by a low level of shipper participation. This is because northbound traffic already benefits from rates which are lower and less volatile than southbound rates. However, the expansion of the call session in such northbound commodities as salt and fertilizer appears to be promising. Since fertilizer is closely related to and understood by the grain industry, it is a natural commodity for barge-owning grain companies to ship on northbound trips.

Ohio Grain Shipments on the Great Lakes

Introduction

Grain shipments from the Port of Toledo increased from 51 million bushels in 1974 to 168.2 million bushels in 1978 (Figure 4), an increase of 230 percent over a four year period. The rapid expansion of the U.S. grain export market in the 1970s and the appeal of water transportation as the most energy-efficient means to ship grain transformed Toledo into a bustling marketplace for Ohio, Indiana, and Michigan grain.

This section will discuss the factors which threaten the vitality of the grain market at the Port of Toledo. In addition, this section will assess the role of the Port Authority, the issue of extending the shipping season, and the handicap of the Great Lakes lock system.

Diesel Fuel Prices and Railroad Competition

As diesel fuel prices climbed steadily throughout the 1970s, it became more expensive for producers and elevators to truck grain to a Toledo terminal facility (97 percent of all grain received at Toledo is shipped there by truck). At the same time railroads were building more unit train facilities in the countrysides of Indiana, Michigan, and Ohio. Since 1976 the number of unit train facilities in the Toledo market area has doubled. The proliferation of unit trains, together with deregulation of the railroad industry in 1980 have allowed railroads to compete more effectively with the water mode. In recent years it has become less costly for many grain suppliers to truck their grain to a nearby unit train facility rather than to a port facility at Toledo. For this reason, grain merchants at

Figure 4: Toledo Grain Shipments For The Past 25 Years

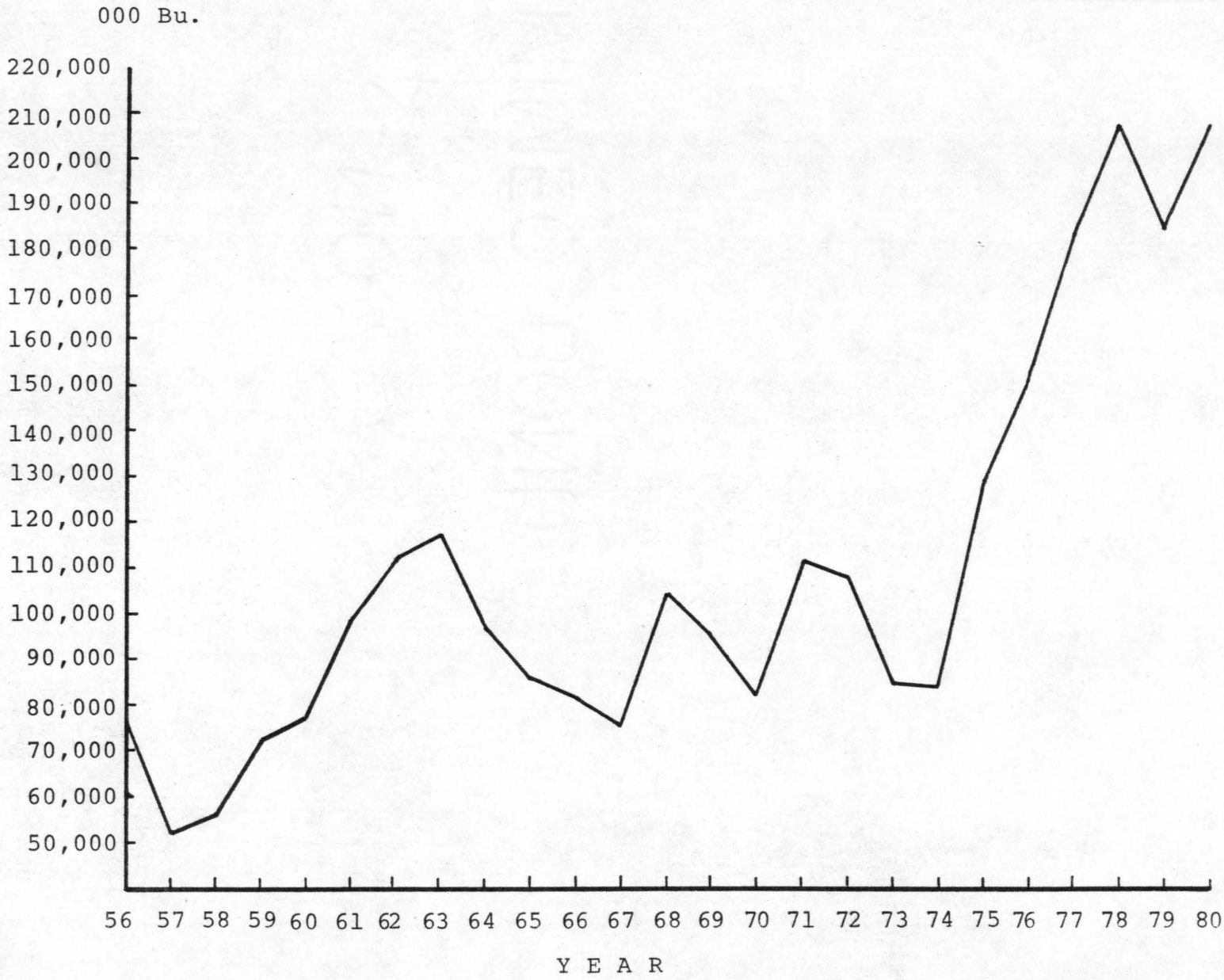


Figure 5: Comparison of Ohio and Michigan April 1 Grain Stocks with Toledo Grain Shipments

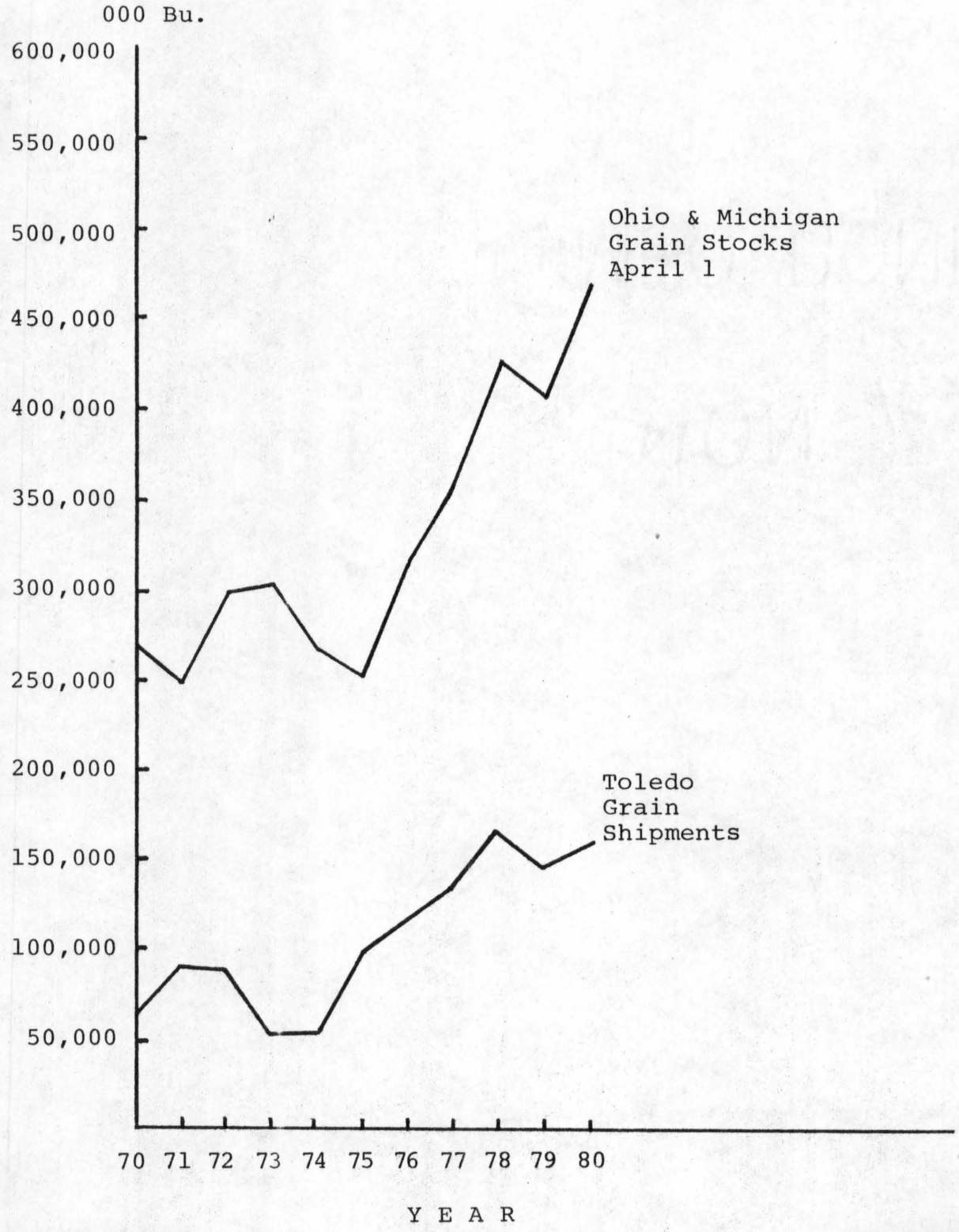


Table 2: Toledo Elevators and Capacities

	(000 Bu.)
The Andersons (Maumee)	17,000
The Andersons (Toledo)	7,000
Cargill, Inc. (Maumee)	4,900
Cargill, Inc. (East Toledo)	1,300
Cargill, Inc. (West Toledo)	4,000
Michigan Elevator Exchange	6,000
Mid-States Terminals, Inc.	9,000
Nabisco, Inc.	6,000
The Rice Grain Company	1,100
TOTAL	56,300

Table 3: Comparison of Great Lakes Port Shipments of Grain

Port	1978	1979
	- - - - - B U S H E L S - - - - -	
Chicago & South Chicago	77,864,000	91,238,000
Milwaukee	35,847,053	58,682,315
Toledo	168,193,000	147,244,000
Duluth-Superior	305,984,668	251,326,075
Thunder Bay	511,661,237	454,618,091
Saginaw	11,339,938	12,187,142
Huron	12,990,512	6,276,291
Wallaceburg	2,745,317	2,784,349

Toledo fear a significant diversion of grain from the Toledo market may occur in the coming years as fuel prices continue to rise.

Backhaul Cost

A significant factor in the cost of most transportation services is the cost of "backhaul." Ideally, Great Lakes vessels carrying grain and coal from lake ports to the lower St. Lawrence River return with loads of iron ore and imported steel for use in such industries as automobile manufacturing. If the flow of iron ore and steel is disrupted for any reason and the vessel must operate empty on the return trip, the return or "backhaul" costs must be borne by the grain shippers. A slump in the automobile industry, which depresses the demand for steel, can increase the cost of shipping grain on the Great Lakes. Steel trigger-pricing can likewise increase grain shipping costs by reducing demand for import steel whenever import prices are forced up. As railroads become more rate competitive, Toledo grain merchants can ill afford these increases in shipping rates.

Demand for Outbound Vessels

Water shipping rates for grain are also affected by the demand for outbound lake vessels. Increasing demand for steam coal by Western Europe could cause more coal from Wyoming, Montana, Illinois, Pennsylvania, and Canada to be shipped via lake vessels. Whether a surge in Great Lake export coal shipments will actually materialize is still questionable, but grain shippers at ports like Toledo are keenly aware of what a higher demand for lake vessels could do to shipping rates.

Competition Between Ports

Competition from other port facilities represents another point of concern to Toledo grain shippers. The new Cargill elevator at Burns Harbor, Indiana, and increased grain loadings at Saginaw, Michigan, provide new marketing opportunities for grain producers who are located in a marginal region between either of these facilities and the Port of Toledo.

Truck Weights and Michigan Grain

Recently there has been a problem between Toledo law enforcement authorities and Michigan grain producers who send truckloads of grain to Toledo which exceed Ohio truck weight limitations. Michigan weight limitations are higher than those in Ohio. Technically, most truckers are breaking the law only when they move grain from the Michigan-Ohio border to ports in Toledo, a distance of five to ten miles. Grain companies in Toledo fear that if a compromise is not reached, many Michigan grain suppliers will not find it economical to send smaller truckloads of grain into Ohio. Discussions are now taking place with hopes of resolving this issue.

Role of the Port Authority

The Toledo Port Authority was created by the City of Toledo and Lucas County on July 15, 1955, designed as a non-profit entity to assist private businesses which require port facilities. As a landowner, the Port Authority obtains revenues from lease agreements with private firms, then lends these funds back to the firms by purchasing industrial revenue bonds. In this way, funds are provided to firms for the development of their port facilities.

The Toledo Port Authority is also familiar with land which is not owned by the Authority but is zoned industrial. The Port Authority eases a private entreprenuer's access to this land by expediting bureaucratic processes as well as providing financial resources. This relationship has worked with much success at the Port of Toledo and firms at the Port appreciate having a government sponsor to lobby for their cause on issues like the St. Lawrence Seaway.

Background and Issues Surrounding the Seaway

The St. Lawrence Seaway has been a controversial topic since it was built in 1959. At that time the Canadian government contributed 5/7 of the funds for its construction. The United States agreed to lend money to the project on condition that the seaway pay $2 million per year against the outstanding debt. This agreement was a compromise between proponents of the seaway and representatives of East Coast businesses who did not want the seaway to detract from Atlantic Coast trade. The interest on the loan has since been forgiven but $108 million is still owed to the U.S. government. In addition, all operating costs and further construction costs are borne by the seaway and are paid for by user tolls.

Great Lakes port authorities argue that the railroad, trucking, and barge industries all receive hefty government subsidies while seaway development is expected to be self-sufficient. Proponents for government financial support of the seaway want the seaway debt erased and government funds appropriated for seaway development.

Extension of the Shipping Season

To Great Lakes port authorities and shipping officials "seaway development" includes extending the shipping season into the winter

months. The costs and benefits of this proposal have been debated among federal and state politicians, shipping officials, environmentalists, and railroad authorities. The cost of such a venture is estimated at $441 million to enable the purchase of two dozen Coast Guard icebreakers, steam systems, heating cables, air bubblers, booms, and water-jet machines. Needless to say, the current political climate in Washington does not seem to favor the passage of such a plan.

Handicaps of the Lock System

The rebuilding of the lock system on the Great Lakes is another project for which there are no funds available. The locks were outdated by size shortly after the completion of the St. Lawrence Seaway in 1959. Special vessels, called "lakers", operate exclusively on the Great Lakes and are used to carry commodities between Great Lake ports and lower St. Lawrence ports where ocean vessels can navigate. In contrast to the typical laker capacities of 25,000 tons, the large container-type ocean vessels (called "salties") have capacities of 50,000 tons or more.

According to one transportation official at a grain firm in Toledo, if the Great Lakes lock system could handle ocean vessels, Great Lakes shipping would dominate U.S. grain transportation "hands down." The efficiencies of size gained in loading ocean vessels would make most railroad and barge alternatives virtually non-competitive with Great Lakes shipping.

Transportation Issues Common to Toledo and Cincinnati Markets

Introduction

This section will compare the similarities and differences between the grain markets in Cincinnati and Toledo. Both markets offer efficient water transportation to grain producers in Ohio and other neighboring states. But grain shippers in both markets are concerned with the competitive threat of the railroads to the water transportation industry. Grain firms in both cities are also concerned with the potential impact of increasing grain demands from domestic users, especially grain alcohol producers. Differences between the two markets lie in such areas as grain storage requirements, types of water transportation, and the seasonal impact on business activities. In addition, this section will discuss the nature of the competition between the two markets.

Railroad Competition

The most significant challenge to the Cincinnati and Toledo water transportation markets comes from the railroads. As one Cincinnati grain merchant observes, "Railroads have gotten smarter." Indeed, water transportation which once benefitted from rail car shortages and non-competitive rail rates, must now face an intensely competitive railroad industry. The proliferation of unit trains offer low rates to grain shippers and improve rail car availability by decreasing turnaround times for hopper cars. Railroad deregulation allows railroad firms expanded freedoms to set rates and negotiate long-term contracts with shippers. Mergers between rail firms and abandonments of unprofitable lines undoubtably will strengthen the abilities of the railroad industry to compete with water transportation for long-haul traffic.

The appeal of the Cincinnati and Toledo markets will change as rail rates to the East Coast become more competitive and rising diesel fuel prices make it more expensive for a grain producer to truck grain to a water port facility. Improvements on East Coast port facilities will allow the East Coast to ship more export grain to European and Soviet markets. In terms of distance, it is more practical to ship European and Soviet-bound grain from the East Coast rather than from the Gulf. Competitive rail rates and improved handling capacities on the East Coast will divert more grain from the Cincinnati and Toledo markets to the Eastern market.

Domestic Users

Increasing domestic requirements for grain are expected to put additional competitive pressure on the grain markets in Toledo and Cincinnati. Domestic users include wet millers, cereal processors, poultry farms, and ethanol (grain alcohol) plants. A corn fungus disease called alphatoxin was the cause of a recent poor corn crop in the Southeast. As a result, the Southeastern poultry industry substantially increased its demand for Midwest grain and put upward pressure on grain prices.

The Ethanol Industry

While the increase in demand by the Southeastern poultry industry put only temporary pressure on Midwest grain prices, the expected increase in the demand for grain by ethanol producers promises to be longer term. Figure 6 and Table 4 indicate the location and output capacities of Ohio ethanol facilities. Other plants in Michigan and Indiana promise to compete for corn in the Toledo and Cincinnati market areas. If only half of the ethanol plants in the Toledo market are completed by 1984, they will require 50 million

Figure 6: Planned Corn Ethanol Plants - Jan. 1981
(million gallons per year)

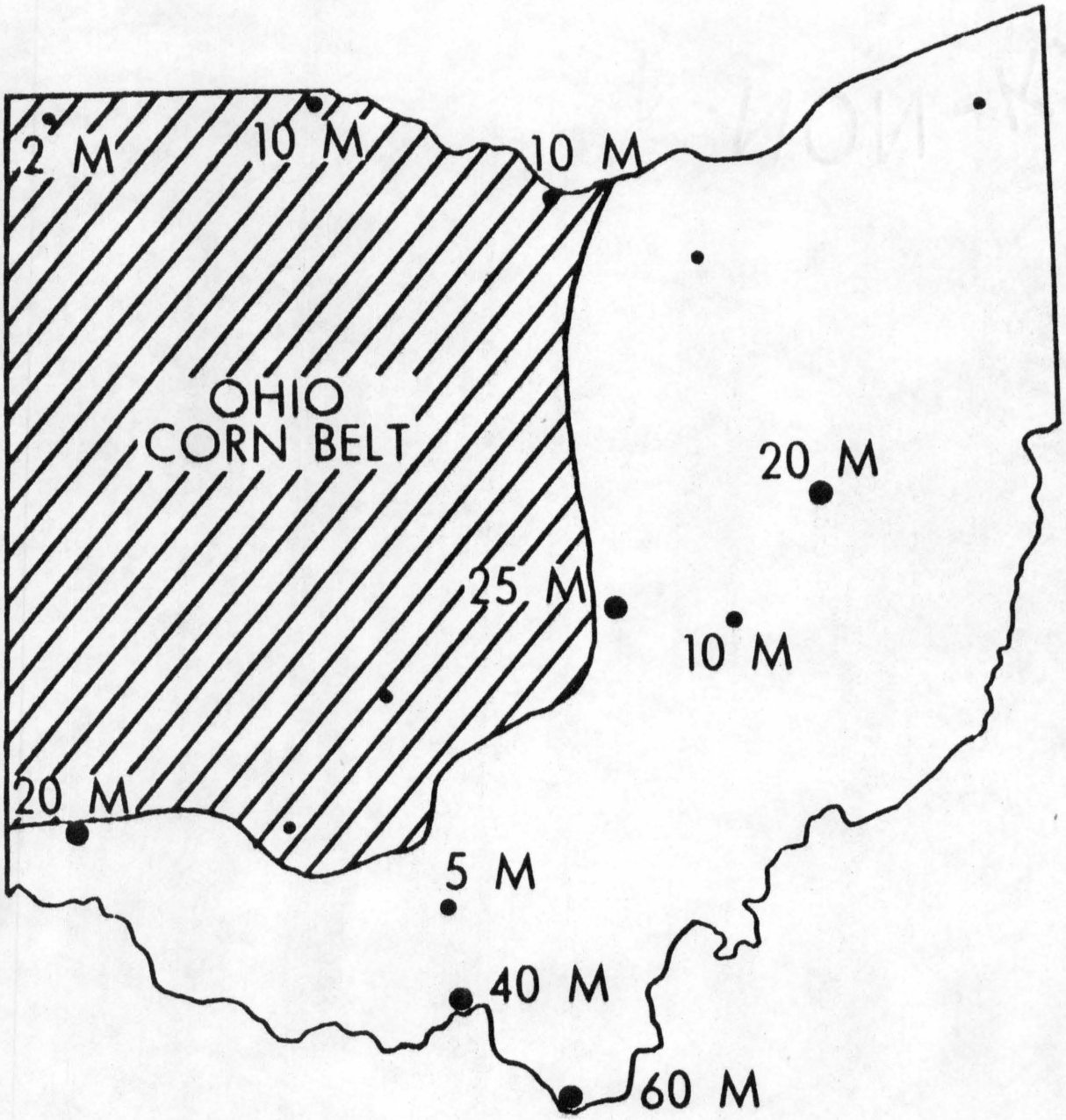


Table 4: Potential Alcohol Production - Ohio 1980

LOCATION	ANNUAL CAPACITY (GALLONS)	FUEL SOURCE	OTHER
1.) SOUTH POINT (LAWRENCE)	60 M	COAL	REFINERY
2.) NEW BOSTON (SCIOTO)	40 M	COAL	INDUSTRY COMPLEX
3.) NEWARK (LICKING)	25 M 60 M	COAL	-
4.) HAMILTON (BUTLER)	20 M	COAL	-
5.) NEW PHILADELPHIA (TUSCARAWAS)	20 M	COAL	-
6.) HURON (ERIE)	10 M	-	-
7.) TOLEDO (LUCAS CO.)	10 M	COAL	
8.) ADAMSVILLE (MUSKINGHAM)	10 M	COAL	
9.) PIKETON (PIKE)	5 M	METHANE	DAIRY, FEED-LOT, CHEESE
10.) PIONEER (WILLIAMS)	2 M	N.G.	
11.) NEW VIENNA (CLINTON)	1.2 M	METHANE	HOGS
12.) LITCHFIELD (MEDINA)	1.0-3.0 M	MUNICIPAL WASTE	
13.) MT. STERLING (MADISON)	.5 M	N.G.	
14.) JEFFERSON (ASHTABULA)	.3 M	-	-
TOTAL	205 M		

bushels of corn annually for full operation.[3/] The ethanol plant at Southpoint, Ohio, will put pressure on the Cincinnati grain market when it begins processing 24 million bushels of corn annually.

A crucial point in considering the potential impacts of the developing ethanol industry is that once a grain alcohol facility begins operations, it will purchase, regardless of grain market prices, whatever grain it needs to maintain capacity production. The fact that many of these facilities are partially funded by government subsidies gives further assurance to private grain companies that ethanol producers will have little difficulty obtaining the grain they require. Some grain firm representatives point to the developing ethanol industry and predict increases in corn production as farmers react to rising corn prices and plant corn on marginally productive land.

Energy Efficiencies in Grain Transportation

From Table 5 it can be concluded that unit trains are very competitive with barge transportation from Ohio to the Gulf. In fact, a 100-car unit train is more energy-efficient than the barge mode when rail miles are compared to river miles. For example, on the same St. Louis-New Orleans trip, a 35 barge tow requires 276 BTU per ton-mile. A 100-car unit train requires 280 BTU per ton-mile. But the barge tow must travel 1,049 river miles to reach New Orleans while the unit-train travels only 685 rail miles. The barge tow must travel over 1.5 times farther than the unit train. After adjusting the energy efficiency of barges to equivalent rail miles, the barge mode requires 423 BTU per ton-rail mile.

[3/] With the current anti-spending mood in Washington, some government supported ethanol projects might not receive funding.

Table 5: Energy Efficiency of Barge, Rail, Truck, and Ships in Grain Transportation

Type of Transportation	BTU Per Ton-Mile
Barge	
6 barge tow (9,000 tons) Ohio River	321
35 barge (52,500 tons) Lower Mississippi River	276
35 barge (52,000 tons) Lower Mississippi equivalent rail miles	423
100-Car Unit Train	
Flat terrain (Ohio to Gulf)	280
Hilly terrain (Ohio to East Coast)	560
Truck	1,400
Great Lakes Vessel (25,000 tons)	330
Ocean Vessel (50,000 tons)	170

Even though the unit train is an extremely efficient means to ship grain to the Gulf, one transportation official at a large grain firm maintains that the Mississippi River System (which includes the Ohio River) "dominates grain movement because it is there, it is big, it is available; rail does not have current or potential capacity to replace it." Because of hilly terrain on the route from Ohio to the East Coast, unit trains require twice as much energy per ton-mile than on the trip to the Gulf.

It is clear that large efficiencies of size would be gained if ocean vessels could navigate within the Great Lakes system. The typical "laker" vessel which calls at the Port of Toledo requires almost twice as much energy as a 50,000 ton ocean vessel.

Trucking is by far the least energy-efficient of all modes of transportation. As diesel fuel prices continue to increase, grain shippers will seek more ways to minimize their requirements for truck transportation. One of the concerns of Toledo grain firms is the increasing numbers of grain suppliers who have recently stopped trucking grain to Toledo and instead are shipping grain by unit train to the East East.

Requirements For Grain Storage

Grain storage facilities on the Ohio River are vastly different from those at the Port of Toledo. While grain firms at Toledo have tremendous storage capacities, there are some firms on the Ohio River that do not store any grain. The two main factors which explain the different grain storage requirements in these two areas are the impact of winter and the amount of grain necessary to load a shipping vessel.

The freeze-up of the Great Lakes between December 15 and April 1 requires Toledo grain firms to maintain massive grain inventories to ensure maximum utilization of the Lakes system when shipping activity resumes in the spring. Toledo grain merchants compete with grain firms in Cincinnati and elsewhere which can ship grain year-round by either barge or rail. To minimize the seasonal impact on their business, grain firms at Toledo have significantly expanded their storage capacities in recent years. Grain shipping on the Ohio River is usually not restricted by seasonal changes and therefore grain does not need to be stored for long periods of time.

The second factor in determining a need for storage capacities is the amount of grain required to load a shipping vessel. A grain shipper in Cincinnati needs 9,000 tons of grain to load a six barge tow. In contrast, ships of the class which call on Great Lakes Ports have capacities of 25,000 tons. The "surge" of grain needed to load a single unit at the Port of Toledo demands that a Toledo grain firm have grain in storage.

A secondary reason for storing grain at Toledo is demurrage. A firm at Toledo must be able to load grain quickly and efficiently to avoid incurring substantial demurrage charges. It cannot afford to wait for grain to be shipped from storage facilities which are located away from the port terminal. On the other hand, grain shippers on the Ohio River often use barges to store grain for short periods of time. If a grain shipper can sell grain at a margin which exceeds interest costs and the per bushel demurrage cost of holding a barge, the shipper will pay demurrage to enable large volumes of grain to be processed by his elevator. The shipper in

effect is buying time. This time is also used to gather grain from storage facilities at nearby farms and elevators. The demurrage strategy offers the barge shipper a short-term solution to a lack of storage facilities.

Competition Between Cincinnati and Toledo

As outlets to grain export markets in close proximity to one another, the grain markets in Toledo and Cincinnati contend with one another for grain. If unit train facilities are not readily available in a region located roughly halfway between Toledo and Cincinnati, grain from this region will be transported by truck to the market which offers the highest price. A grain company in either Toledo or Cincinnati can exercise a powerful leverage if it has taken a favorable position in the grain market. For example, a company which sold grain when the market was up, can outbid other grain purchasers when the market goes down and not lose money. This advantage allows a company to buy and ship grain from production regions which normally are uneconomical sources of supply.

Government Agencies in Water Transportation

Water transportation could be an example of bureaucratic entanglement at its worst. Among the agencies with interests in water transportation are the U.S. Departments of Transportation, Commerce, Interior, and Agriculture, the Environmental Protection Agency, and the U.S. Coastguard. While conflicts of interest would seem inevitable, the resolution of issues concerning water transportation is surprisingly a well-coordinated process. Specific procedures allow for proper studies to be conducted, reports to be written and circulated, and all viewpoints to be considered

before final judgments are made. There is a general consensus among representatives of grain firms, the Army Corps of Engineers, and the Toledo Port Authority that the government decision-making process in water transportation is specific and fair.

Closing Comment

While Toledo and Cincinnati grain firms must deal with a number of factors which threaten the vitality of their markets, the net effect is likely to benefit Ohio agriculture. As the grain firms seek to retain and increase their shares of the grain market, grain producers will benefit from improved transportation services and higher prices for their product.

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